



Technologies of Interdisciplinary Approach in the Development of Eco–Steam Educational Competencies of Future Teachers

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Abstract: In this article, environmental education for students, Eco–STEAM education is interdisciplinary and practical orientation of students, physics, biology, geography, informatics, technology, visual arts and engineering thinking, imagination, cooperation, creative abilities, formation of interdisciplinary environmental culture through independent education outside the classroom. thought about.

Keywords: Eco–STEAM, environment, environment, students, ecology, education, technology, didactics, literacy, practical, approach, Eco–education program, S–science, T–technology, E–engineering, A–art, M–math, project, integration.

INTRODUCTION. In the modern ecological educational institutions of the world, special attention is paid to the formation of real relations of man with nature, to determine the unique social and natural aspect of nature that ensures the most guaranteed development of the individual, and to master the norms. from behavior. Science and technology play a major role in the development of society, and the importance of education is increasing. The problems facing the science and technology community are complex problems that cannot be solved by science and technology alone and must be solved using modern knowledge. Convergent education is needed to solve this problem. Research is being conducted on convergent approaches that reveal important interdisciplinary concepts or core principles of knowledge teaching and integrated knowledge.

Today, in the developing countries of the world, environmental education is formed as an interdisciplinary educational subject through three main concepts – systematic, ideological, and perspective.

THE MAIN PART. In the new Uzbekistan, integrated education in modern educational institutions, the student's knowledge activity and independent thinking and orientation in educational practice will help to achieve new results as education. The concept of environmental protection defined in the concept of environmental protection is defined in the concept of environmental protection in the ecological education of the new Uzbekistan "Enhancing the ecological culture of the population, the state in the field of environmental protection" increase the level of transparency of the activities of the bodies and strengthen the role of civil society" [1]. In this regard, the National Action Plan for the implementation of the Paris Agreement on climate change in Uzbekistan, strategies for the transition to a "green" economy in 2019–2030, and the National Action Plan for the formation of a new state administration developed and adopted. Caring for the environment is a part of the state policy, and a sense of environmental responsibility is emerging in production enterprises. Therefore, in the future, environmental professions will be in demand in all aspects of human life, from mining and agriculture to tourism and the fashion industry.

STEM was first introduced in the 1990s by the American National Organization. STEM

(science, math, engineering, and technology) has been recommended and implemented in education as a core part of US public education.

Currently, STEM education is in Australia, Canada, and Singapore, and later in France, Great Britain, Australia, Israel, China, Canada, and Turkey. Elements of the STEM approach to the development of the robotics high-tech industry have been introduced into preschool and school education as part of STEM education.

Eco-STEAM education is an actual pedagogical problem that the research topic is waiting for its solution. In our scientific and research work, the interdisciplinary approach to the development of Eco-STEAM educational competencies of future teachers made it possible to open technologies.

The purpose of Eco-STEAM education is to enable future teachers to develop their Eco-STEAM education competences in Physics, Biology, Geography, Informatics, Technology, Fine Arts and Engineering thinking, imagination, cooperation, creative abilities, independent outside the classroom. It consists in improving interdisciplinary methodological support through education through modern media.

As a result, primary education teachers of future teachers developed Eco-STEAM educational competencies of students in practice-oriented mathematics, activation of interest in natural sciences, technology, robotics, design and creative, communication skills.

Eco-STEAM educational competences were developed by primary education teachers to guide students to practice, Physics, Biology, Geography, Informatics, Technology, Fine Arts, interdisciplinary modern media tools in extracurricular activities.

The main content Eco-STEAM technologies are actively used in the additional education system. However, their use in the basic education process has not been studied in practice. This is due to the difficulty of combining innovative approaches with the implementation of the school curriculum.

Eco-STEAM education, technology, art, science and engineering thinking, imagination, collaboration and the ability to demonstrate creativity.

To communicate science information through art and technology, it is important to visually uncover meanings and express themselves in art and develop digital technology and scientific thinking. This interpenetration, catalyzed by digital technologies, is the answer to modern schooling. Pupils' speaking and writing abilities develop. Students' creative thinking and free communication help to achieve results as quickly as possible [4].

Digital laboratories are widely used in elementary school and beyond, which allow to demonstrate and study various parameters of the environment, processes and phenomena, and the operation of devices.

In addition, designed models and devices can be combined with measuring systems.

As part of the development of eco-STEAM competencies, students actively participate in robotics competition, championships of final working professions in high-tech industries, small Olympiads and similar educational programs. They support technical creativity. Various aspects of engineering and robotics, design, manufacturing and digital manufacturing of complex measurement systems and further development of creative skills[5].

The formation of Eco-STEAM education begins with the development of design, the understanding of the relationships of structural elements, the principles of movement, and allows the creative potential of the student to emerge, while providing an opportunity to acquire technical skills and get acquainted with the principles of engineering. The use of elements made of wood, plastic, magnets, and metals from various materials allows to study the properties of materials and their fields of application.

Various construction complexes designed to teach the basics of mathematics, 2D and 3D geometry, design and technology, and develop spatial and creative thinking in students. Design

complexes make it possible to create complex technical structures and study various properties of objects, learn the basics of mathematical theories.

The composition of constructors includes structural elements using different types and principles of connection to build static and dynamic models [2].

Also, various materials are used – soft and hard plastic, magnetic, wood types. Solutions include special kits for learning the basics of math, outdoor activities, and engineering projects.

Prototyping Eco-STEAM educational software for students is one of the main elements of "Software".

In the process of acquiring Eco-STEAM educational competencies, special knowledge and skills, the student must create his own devices, gadgets, prototype mechanisms and systems within the framework of educational projects. At the same time, it is very important not to limit the maximum disclosure of the student's engineering and creative potential, to put it in front of the need to use standard components and ready-made electronic modules [5]. Prototyping includes electronics and circuits, mechatronics, the use of various materials processing technologies, industrial design and Eco-STEAM to solve design problems, and learning software and design skills.

Eco-STEAM is an interdisciplinary approach to teaching science in which elementary students are given hands-on assignments to find solutions and develop a project to solve real environmental problems.

The Eco-STEAM approach is an effective means of motivating primary school students, as education takes place in the local natural and socio-cultural environment. as a context for the educational experience of elementary school students. The Eco-STEAM approach can serve as an element of encouraging students to study the laws of nature, the relationship between it and society, and research skills in the process of implementing environmental experimental projects.

The Eco-STEAM approach is based on the use of:

environmental collective projects;

extracurricular Eco-STEAM activities in a natural environment;

environmental and experimental projects;

social design of ecological content;

Experiments in the use of a digital laboratory in the field of environment.

Eco-STEAM education requires many people with scientific and technical knowledge, new creative approaches to problem solving, awareness that humanity may face technological and environmental disasters in the near future.

Learning in the Eco-STEAM classroom is always about trying to solve some real problem. Students work in teams, explore, experiment, come up with designs, promote their products on social media, and create websites and cartoons.

In the Eco-STEAM project, they studied the problem of pollution of the Earth with single-use plastic waste. Students will learn about the different types of plastic waste, how long it takes for different types of plastic waste to break down, and come up with their own solutions to the problem.

Creation of biodegradable plastic production in general secondary education school classes. In this project, elementary school students developed their own method for making potato starch bags. Students actively promote their development on social networks and Internet platforms.

In the 21st century, ecological thinking is a superprofessional skill. It should be not only for environmentalists, but for everyone in any activity, from professional to household.

Developing jobs in Uzbekistan, that is, future jobs related to ecology:

Urbanist–ecologist; Processing technologist; Specialist in elimination of systemic environmental disasters; Ecoauditor; Environmental preacher; Clothing recycling specialist; Park ecologist; eco–analyst in the field of construction; Environmental leader.

Eco–STEAM mobile game "Revival".

The game allows you to:

Formation of algorithmic thinking style in students.

Develop algorithms and learn to act according to them.

Students create a program during the game "Revival".

The game teaches students to take care of the environment. Students learn that end–of–life items can be recycled and given life back to preserve the planet's natural resources. For this purpose, students playfully study a separate collection of different types of waste.

The game contributes to communicative development, the manifestation of initiative and independence, and the ability to work in a team.

Development of Eco–STEAM competences with future students of elementary education, together with teachers and students of elementary education in comprehensive schools on Eco–STEAM education from theory to practice implementation of experimental work.

Using Eco–games and projects Eco–STEAM technologies, it is possible to look at the process of studying the world around us from a new perspective, master the psychological mechanisms of personality formation, and achieve good results [6].

In order to increase the effectiveness of the educational process in natural science lessons, the following educational technologies are used, taking into account the age characteristics of students.

Communicative education technology focused on the personality of the student is studied based on the individual characteristics of each student. Prioritizing the problem–searching and creative activities of primary school students, various forms of work such as pairs, groups, and project work are used in lessons using communicative educational technology [3].

Eco–STEAM technologies of interdisciplinary approach to the development of educational competences develop in students the phenomena occurring in nature and the relationship between them and the engineering thinking style, the ability to get out of critical situations, and teamwork. Students demonstrate competence in various areas of life. In addition to connecting objects with real life, the Eco–STEAM approach opens up opportunities for students' creativity [7].

The Eco–STEAM approach sets elementary school students a number of design tasks. Thanks to such tasks, the student not only generates interesting ideas, but also implements them immediately. He learns to design based on available resources, which will definitely help in real life.

He should keep the students' attention on the educational material using technical means. elementary school arouses the interest of students, creating a comfortable emotional and psychological microclimate in classroom and extracurricular activities also plays an important role.

CONCLUSIONS. There are many advantages to collaborative technology teaching, group work, and pair work. It helps to achieve educational goals, get used to responsibility, mutual support. increases students' efficiency, develops cognitive activity, independence, expands students' interpersonal relationships. It can be used both in learning new material and in strengthening, repeating and summarizing lessons.

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